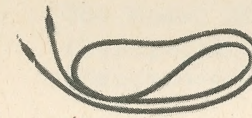


A-2800

INSTRUCTIONS

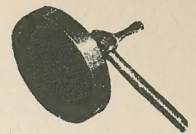
FOR SETTING UP AND OPERATING



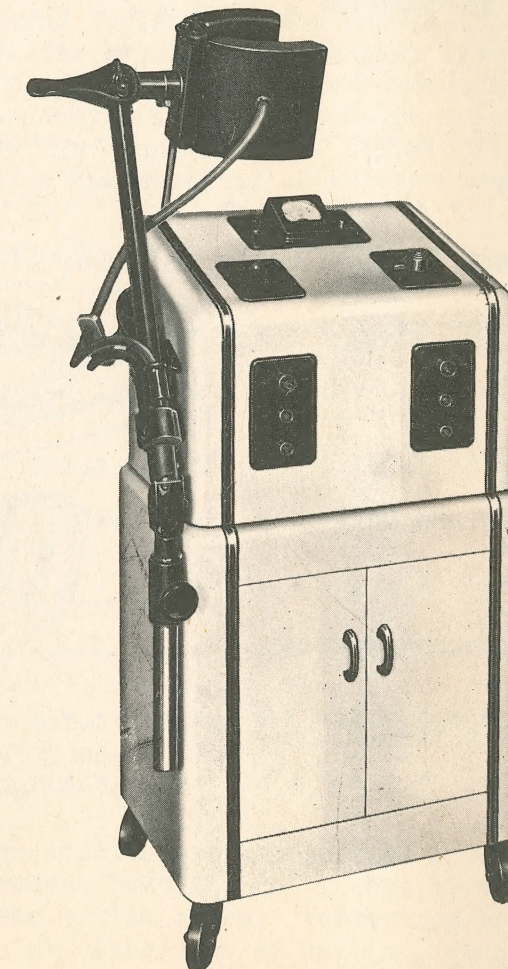
INDUCTANCE CABLE



MODEL SW-221 SHORT WAVE GENERATOR

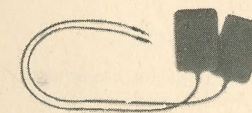


FLAT
TREATMENT DRUM—
HINGED AND FLAT
DRUMS AVAILABLE)



IMPORTANT NOTICE TO USER

These instructions have been prepared to assist you in the safe and efficient operation of your machine. It is to your advantage to study them carefully, following suggestions as given, so that maximum satisfaction is obtained from the unit.



CONDENSER PADS

THE LIEBEL-FLARSHEIM CO.
303 WEST THIRD ST., CINCINNATI, OHIO



CUFF APPLICATORS

E

INDEX

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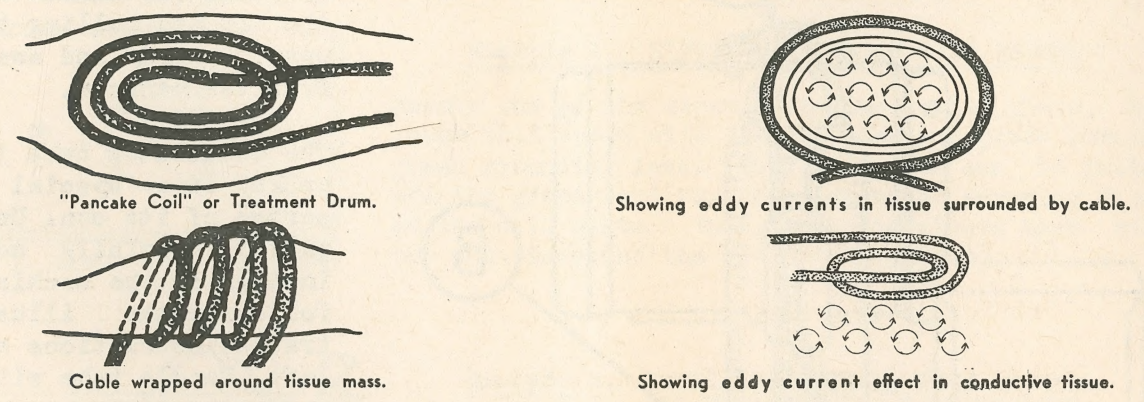
IMPORTANT PRELIMINARY INFORMATION

The Model SW-221 Short Wave Generator is designed to produce penetrating therapeutic heat in tissues by the following methods: Treatment Drums, Inductance Cable, Condenser Pads, Cuffs and Orificial Applicators.

- I. Inductance (Electromagnetic Induction) Type Applications
1. Inductance Cable
 2. Hinged Treatment Drum
 3. Flat Treatment Drum

Each inductance type applicator is a continuous conductor from which there is no direct transfer of electrical energy into the tissue. The presence of the high frequency current in this conductor, however, sets up "eddy currents" in the conductive tissues which, in turn, produce heat. The Treatment Drums employ the "pancake coil" principle and the Inductance Cable may be used either as a "pancake" or as a "wrap-around" coil.

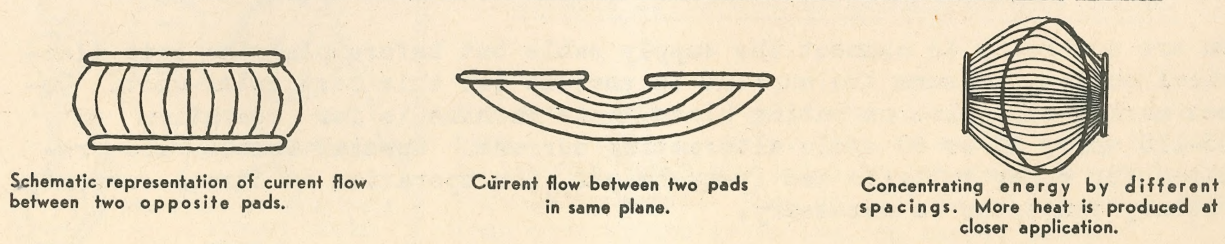
DIAGRAMMATIC EXPLANATION OF ENERGY DISTRIBUTION WITH CABLE AND DRUMS



- II. Condenser (or capacitive) Type Applications
1. Pad Applicators
 2. Cuff Applicators

The condenser type applicators are applied opposite to each other or in the same plane and produce heat in the tissues by direct transference of energy from one applicator to the other. Variations in spacing and placement permit concentration or dispersion of heating, as desired.

DIAGRAMMATIC EXPLANATION OF ENERGY DISTRIBUTION WITH PADS AND CUFFS

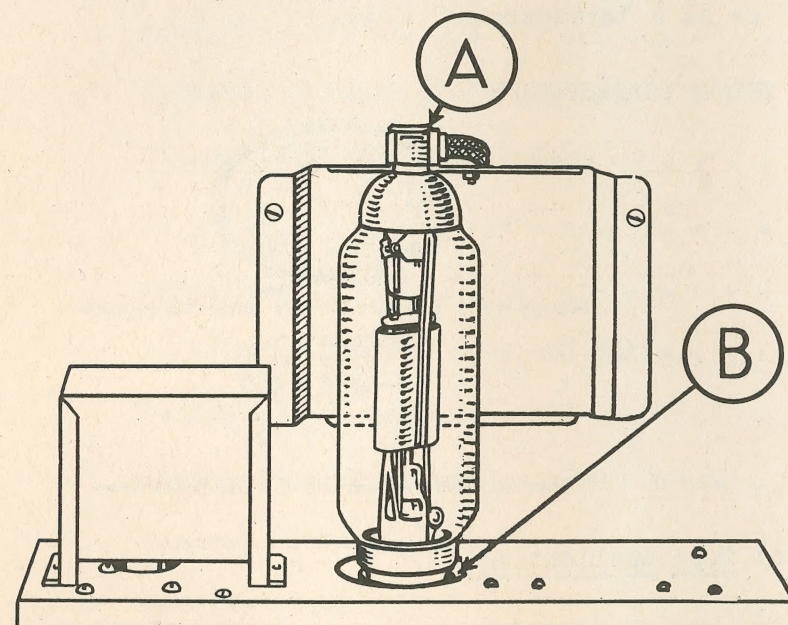


SETTING UP AND PREPARING MACHINE FOR SERVICE

The complete SW-221 comes packed in one case and two cartons. The wooden case contains the generator itself which may be easily unpacked by removing the cover, lifting away top brace which holds the unit down in the case and then lifting out the machine. The large corrugated carton contains the sub-cabinet with accessories (including Treatment Drum) packed inside the sub-cabinet cupboard. The Counterbalanced Supporting Arm is packed in its own carton shipped inside the large carton containing subcabinet and accessories. The power tube is shipped separately in a special corrugated paper tube carton.

INSTALLATION OF TUBES

Diagram Showing Position and Connection of Tube



Place tube in socket (B). The pin in tube base fits slot in socket. Push down tube and turn 1/4 turn clockwise. Braided wire lead is then slipped on cap terminal on tube at (A). Replace back before plugging in supply line.

side edges of panel), into the cut-outs in sides of the cabinet opening. Then push the panel downward into position, fastening with the two screws previously removed.

You are now ready to connect the supply cable but before plugging into electrical outlet, be sure the current is correct for this particular unit. Unless marked otherwise on rating plate, this machine is for operation on 105-125 volt, 50 or 60 cycle alternating current. Special Models are required for other voltages and frequencies. For operation on direct current, a rotary converter is necessary.

The back panel of the cabinet is taken off and laid aside. This is accomplished by removing the two screws at the top of the panel, grasping the knob at the top and pulling the panel upward and away from the cabinet.

The oscillator tube is packed in a special carton of its own. Unpack it carefully and install in the machine, following the illustrated instructions at left. Handle tube with care.

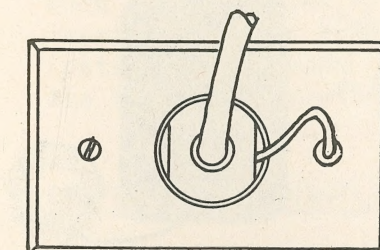
When tube has been installed, replace the back panel by holding the top edge slightly away from cabinet so as to engage the two guides (at the lower

INSTRUCTIONS FOR GROUNDING CABINET

It is accepted practice to ground all electrical apparatus housed in metal cabinets. Accordingly, the necessary wires and screws for proper grounding of the apparatus, are included with the SW-221. These will be found in an envelope in the storage compartment of the machine.

Because most modern wall box receptacles are grounded, a good ground can usually be had by connecting the green lead on the male end of the supply cable directly to the receptacle box cover (see example 1 and 2 below). However, in some instances, it may be necessary to connect to a radiator, steam line or water pipe to be sure of a proper ground (see example 3 below).

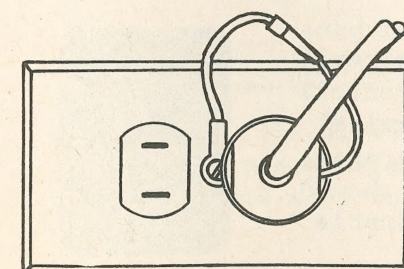
To be sure about which method of grounding to use, determine first whether or not your wall box receptacle is grounded. Remove the cover and see if a metal pipe or "BX" flexible cable is connected to the outlet box. If so, you may make your ground connection to the box as in example 1 or 2. If not, or if you are unable to determine whether wall box is grounded, use method under example 3 - or consult building superintendent, architect or electrician.



NO. 1. SINGLE OUTLET RECEPTACLE WITH GROUND.

Example 1. SINGLE RECEPTACLE WITH GROUND

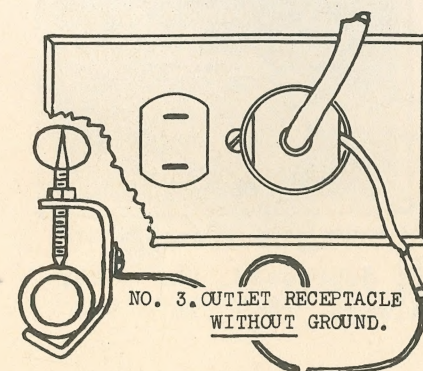
Remove one of the screws from the outlet plate. Replace this screw with the threaded end-piece from the green grounding lead. This end-piece can be pulled off the green lead for the purpose of screwing it into the wall plate. Then, push the sleeve back over the end piece and the cable is grounded.



NO. 2. DOUBLE OUTLET RECEPTACLE WITH GROUND.

Example 2. DOUBLE RECEPTACLE WITH GROUND

On this type of receptacle, it will be necessary to use the short grounding wire included with grounding accessories, because the screw only (as used with single outlet) would be in the way of plugging in the supply plug. Remove the screw from the plate and slip it through the ring end of the grounding wire - then replace and screw it tightly to the wall plate, being sure that you get a good metal-to-metal contact. Then connect the other end of the short wire to the green lead, as illustrated.

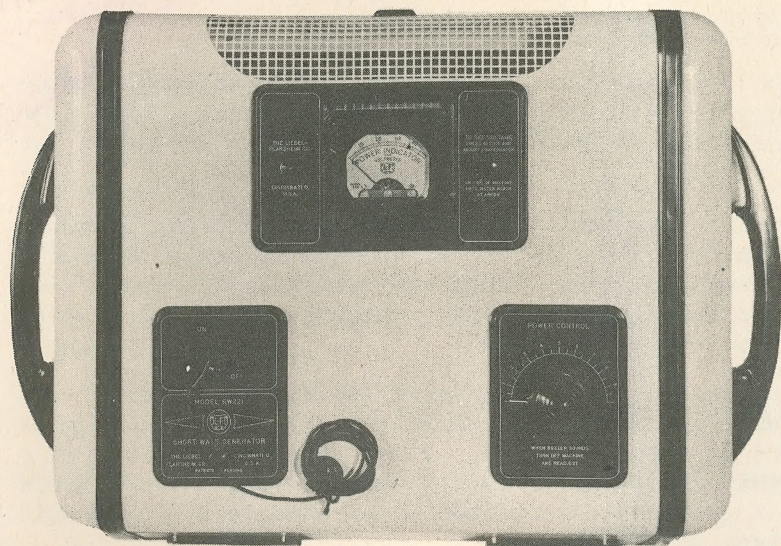


NO. 3. OUTLET RECEPTACLE WITHOUT GROUND.

Example 3. OUTLET RECEPTACLE WITHOUT GROUND

Use the long grounding wire, also included with grounding accessories. Fasten the clamp securely to steam pipe, radiator or water pipe -- making sure, if pipe is painted, that the point of the thumb screw pierces through to metal. Then connect the other end of this long wire to the green lead on supply cable.

VIEW OF CONTROL AND METER PANEL



All controls, with the exception of the Voltage Compensator, are located on the slanted top panel of the unit.

(See illustration at left).

MAIN SWITCH

The Main Switch is on the left-hand side of control panel. When switch is thrown to the "On" position, the tube lights up and the pilot light at left of meter will glow, showing the machine is ready for operation.

The Patient Pull-Off Cord is attached to the Main Switch knob and should be held by the patient if left unattended. Thus, the patient can turn off current, if necessary.

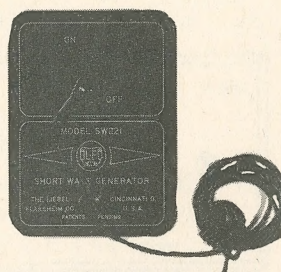
POWER CONTROL

The Power Control is on the right hand side of control panel and is used to adjust power output into patient circuit for all modalities. When starting treatment, power control should be set at zero and advanced from there (clockwise) to the desired point for treatment to patient's tolerance. For best efficiency and stability, the Power Control should never be advanced quite to the point of maximum attainable meter reading.

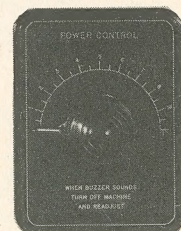
POWER INDICATOR AND VOLTMETER

The meter assembly, with pilot light and push button, is at the top center of the control panel. This meter performs two functions:

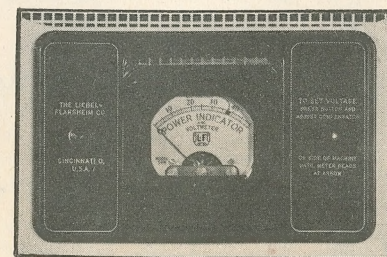
- Power Indicator - which gives a reliable relative indication of the amount of energy delivered to the patient.
- Voltmeter - When the push button (to the right) is depressed, the meter indicates the tube filament voltage, and should always read in the black section of the scale (37 - 39).



MAIN SWITCH

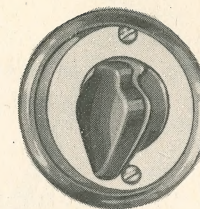


POWER CONTROL



POWER INDICATOR AND VOLTMETER

VOLTAGE COMPENSATOR

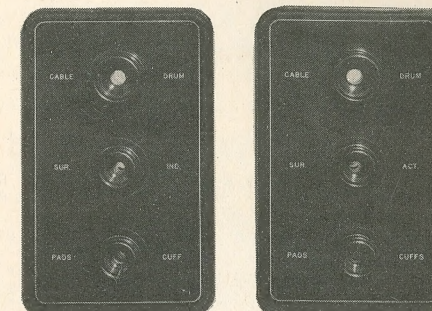


VOLTAGE COMPENSATOR

If the meter does not read in the black section of the scale (with button depressed), the Compensator Switch (center of left side of unit) should be turned until it does read in the black section. This Switch adjusts the machine to differences in voltage which may occur in the electric supply line.

OUTPUT TERMINALS

are located on the front of the cabinet, plainly marked for connection of the various applicators used with this machine.



Connect to "Cable-Drum" terminals when using Inductance Cable or Treatment Drum. When using Pad or Cuff Applicators, connect to the two terminals marked "Pads-Cuffs". When using machine for electro-surgery, the electrode handle should be connected to the terminal marked "SUR. ACT." (Active). The indifferent (patient) electrode (one of the Pad applicators) should be connected to the terminal marked "SUR. IND." (Indifferent).

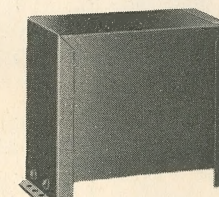
SUPPLY LINE CONNECTION

At lower back of cabinet is a male receptacle to receive the female plug of the supply cable.

FOOT SWITCH CONNECTION

At the back, immediately above the Supply Line Connection, is the female foot switch receptacle into which the foot switch terminal is plugged when the machine is used for electro-surgery.

PROTECT-A-TUBE



L-F "PROTECT-A-TUBE"

Inside the unit is an automatic device which reduces the power and sounds an audible buzzing signal if some unusual condition threatens to create an overload of tubes or circuit. When this occurs, the Main Switch should be turned off, the Power Control reduced to zero and the treatment "retuned" when Main Switch has been again turned on.

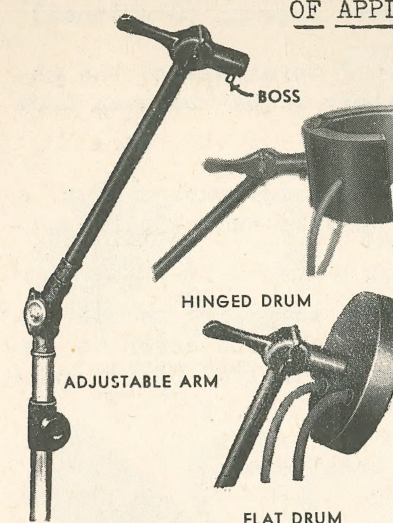
PROCEDURE FOR ALL TREATMENTS

While the operation of the SW-221 is so very simple that it practically amounts to only plugging in the applicators and tuning the machine, a complete outline of treatment procedure is given below for the benefit of the new user.

1. See that both ends of supply cable are solidly connected to machine and to wall receptacle. Connect green lead of supply cable to ground.
2. Position applicator or applicators to patient, with desired spacing, making sure patient is in comfortable position requiring minimum movement.
3. Connect applicator lead plugs into proper output terminals on front of machine, pushing plugs all the way in. Turn Power Control to zero position.
4. Turn on Main Switch.
5. Slowly rotate Power Control clockwise, until patient feels a moderately warm sensation. While patient's tolerance is the most reliable guide to dosage, also pay attention to meter reading, because treatments can be thus duplicated and experience will teach you to use the meter more and more as your guide. For best efficiency and stability, do not advance Power Control all the way to point of "peak resonance". Keep power slightly below maximum attainable meter reading.
6. It is sometimes possible to find unusual application conditions (especially with the Inductance Cable) when a zero setting of the control dial will give something more than zero output. In such cases, if they should happen to occur, it is recommended that the power control be turned all the way over to 10 and the treatment "tuned in" backward (i.e., counter-clockwise). This will give satisfactory control under such special conditions.
7. Recheck filament voltage by pressing push button; reset Compensator if necessary.
8. Attend patient closely for first few minutes because it will probably be necessary to reduce power after heat begins to build up. To reduce heat, turn Power Control back (counter-clockwise).
9. If you leave the patient unattended, have him hold the Patient Pull-Off Cord, so he may turn off the machine if he becomes uncomfortable or if Protect-A-Tube operates.
10. At end of treatment, turn off machine before removing applicators from patient or disconnecting them from the unit.
11. Allow patient to "cool off" for about 30 minutes before going outside, particularly in cold weather.

SEE PAGE 14 FOR GENERAL PRECAUTIONS

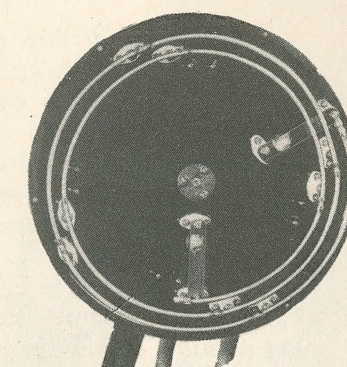
TREATMENT DRUM METHODS
OF APPLYING THERAPEUTIC SHORT WAVE CURRENT



There are two types of Treatment Drums - - Hinged and Flat. They operate by the electro-magnetic induction principle, the same as the Inductance Cable. (See page 3).

The Hinged Drum is standard equipment and, because of its adaptability, can be used for practically every induction type treatment. The Flat Drum is available for limited application to large areas, such as chest, back, pelvis, etc., or for mounting under treatment chair for urological treatments. Each Drum consists of a fixed "pancake Coil" enclosed in a moulded bakelite housing which provides spacing within the Drum.

In the Hinged Drum, there are two such coils, interconnected. The Treatment Drums are used on the Adjustable Supporting Arm which makes their placement extremely simple, speedy and convenient.



When attaching either Drum to the Supporting Arm, note that there is a small projection (or boss) at the end of the crosspiece where Drum attaches. The open portion of the attachment clamp on the back of the Drum passes over this boss and the clamp is then slightly rotated before tightening so that Drum will not fall off the arm even though clamp should be loosened.

EXAMPLES OF HINGED TREATMENT DRUM APPLICATIONS



TREATMENT DRUM METHOD of Applying Short Wave Therapy (Continued)

The treatment Drum leads are connected to the "Cable-Drum" terminals of the machine. The wooden spacer on leads should be approximately midway between Drum and machine so that leads are kept uniformly separated.

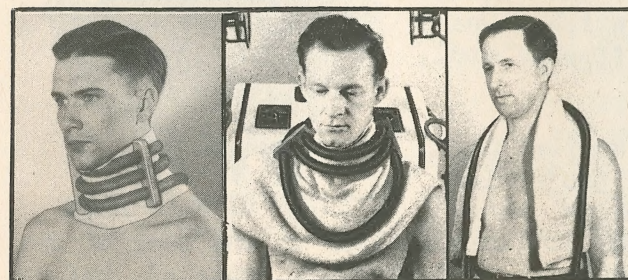
The Drum is designed to be used against the part being treated, except that a layer of toweling or Kleenex should be placed between the drum and skin for sanitary reasons and to absorb perspiration.

Proper spacing is provided within the Drum and to space it away from the patient will make the treatment less effective and will cause the bakelite cover to become heated. To reduce power to patient, use the Power Control -- do not space the Drum away from the part to reduce the heat.

See Page 8 for procedure to be used in giving treatments.

INDUCTANCE CABLE METHOD Of Applying Short Wave Therapy

EXAMPLES OF CABLE APPLICATIONS



Since the advent of the more satisfactory and convenient Treatment Drums, the Inductance Cable is not used as extensively as before, but it is still useful for certain applications such as "wrap-around" treatment to neck and bronchi, single loop autocondensation, and occasional "pancake coil" treatments. The Inductance Cable is the best applicator to use when administering fever therapy in a fever bag. In this application, the Cable is formed into a large loop placed on top of the bag, over the patient. We do not recommend the Cable for "wrap-around" applications to extremities because of the difficulty of making perfectly even turns, with the result that there is a tendency to produce "hot spots".

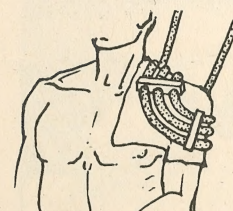
When applying the Cable for treatment, always use a towel next to the skin to absorb perspiration -- and use from 1/2" to 1" spacing. A turkish towel is ideal both for spacing and absorption of perspiration when using the Inductance Cable.

Whether used in "pancake" or "wrap-around" form, the turns of the Cable should be held in place by the Cable Retainer Clips. Always use the Rubber Separator for insulation where the Cable crosses the turns of the "pancake coil".

It is possible to make certain arrangements of the Cable which cannot be "tuned in" satisfactorily with the Output Adjuster. If this happens, a slight rearrangement of the turns and leads will eliminate the difficulty.

OTHER EXAMPLES OF INDUCTANCE CABLE APPLICATIONS

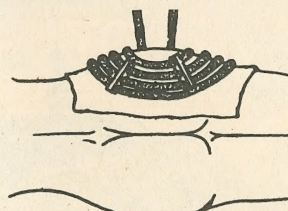
... useful if your unit is not equipped with Treatment Drum and Arm



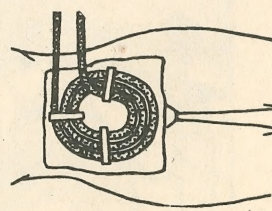
SHOULDER



CHEST

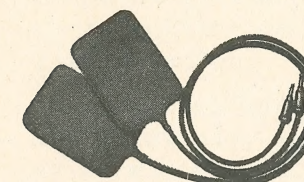


HIP

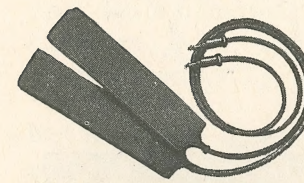


PELVIS

CONDENSER PAD AND CUFF METHOD Of Applying Short Wave Therapy



CONDENSER PADS



CUFF APPLICATORS

Pads and Cuffs operate on the 'condenser field' principle. Pads may be applied in the same plane or with the part to be treated "sandwiched" between them. Cuffs are used most generally for treatment to joints, in which case one cuff is applied to encircle the part above the joint while the other is applied below the joint. Cuffs are also used as long pads for treatment to spine, across both shoulders, etc. One pad and one cuff may be used in combination.

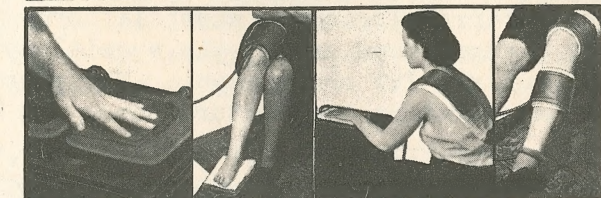
It is quite important, in arranging pads, that both of them be placed on the patient as symmetrically as possible, using same spacing under each pad unless localization of heat is desired. Ordinarily, one or two felt spacers (or equivalent) should be used under each pad but heating can be concentrated by using less spacing under one and more under the other.

Always use one layer of toweling or Kleenex next to the skin to absorb perspiration.

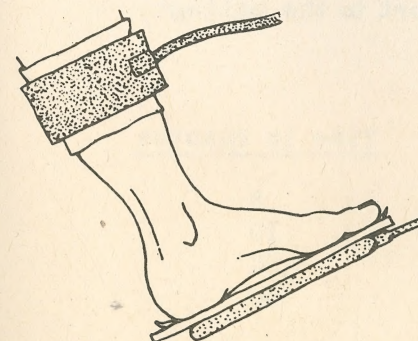
Do not allow the leads to contact patient or conductive objects and arrange them so that they do not touch or cross each other. It is also best not to rest one or both pads directly on Floor, chair, table or couch -- use some non-conducting separation to avoid loss of power to such objects.

The Pads or Cuffs may be held in position, when necessary, by light but secure bandaging with the rubber bandages furnished with the machine. They are heavy enough to support themselves for most applications and can be flexed to fit the contour of the part, which also assists in keeping them in position. See Page 8 for procedure to be used in giving treatments.

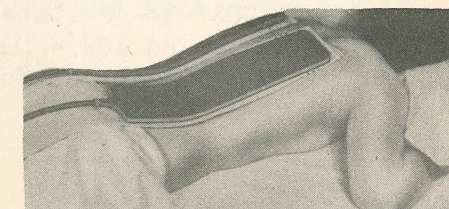
EXAMPLES OF PAD AND CUFF APPLICATIONS



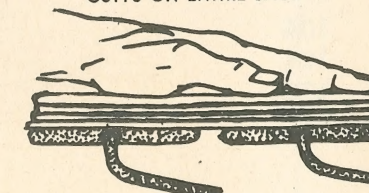
OTHER EXAMPLES OF PAD AND CUFF APPLICATIONS



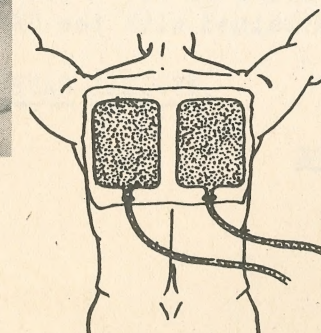
TREATING ANKLE
WITH CUFF AND PAD



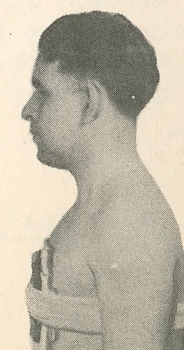
CUFFS ON ENTIRE BACK



TREATING HAND AND WRIST
WITH TWO PADS



PADS ON UPPER BACK



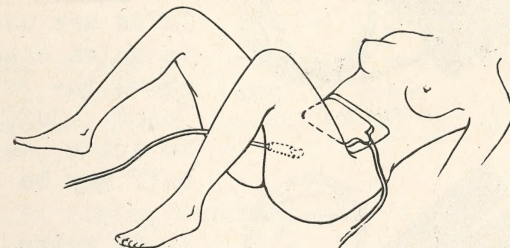
TREATING CHEST
WITH PADS

ORIFICIAL TREATMENTS

(Vaginal and Prostatic)

Many physicians prefer to give pelvic and prostatic treatments with orificial electrodes because therapeutic heat is thus more exactly localized than through use of the Treatment Drum, Inductance Cable or Pad Applicators.

Such treatments are very satisfactorily handled with the Model SW-221, with precise control of the power to produce internal temperatures which will be therapeutically effective and comfortable to the patient.



The conventional metal-tipped prostatic and vaginal electrodes, such as were used with old-time long wave diathermy, are preferred for short wave diathermy treatments. They are safer and more satisfactory than any of the special type electrodes which have been designed particularly for short wave. The electrodes are available with thermometers so that constant temperature check can be maintained.

TO GIVE AN ORIFICIAL TREATMENT

To give an Orificial treatment connect a pad applicator to the left hand (facing machine) "PAD-CUFFS" terminal and apply it over patient's abdomen with spacing between pad and skin of about $2\frac{1}{2}$ inches. This will serve as the indifferent (dispersive) electrode.

Insert the vaginal or prostatic electrode using KY jelly (never vaseline) as the lubricant. The connecting cord (42") is then plugged into the right hand "PADS-CUFFS" terminal of the machine and connected to the electrode.

Starting at zero on power control, increase power gradually as treatment proceeds. It will be found that cramps are likely to develop if power is introduced too rapidly or if temperature exceeds 108° to prostate or 111° to pelvis. Temperature of $107 - 108^{\circ}$ to the prostate and $109 - 111^{\circ}$ to female pelvis are easily attained with the SW-221 and maintained with comfort to the patient.

TYPICAL CASE RECORD - PELVIC TREATMENT

<u>Meter Reading</u>	<u>Temperature</u>	<u>Time in Minutes</u>
10	104	5
15	108	10
20	110	20
20	110	30

USING THE UNIT FOR ELECTRO-SURGERY

A special circuit is provided in this machine which has the same general characteristics as any vacuum tube circuit and which may be used for such minor cutting and coagulation procedures as are ordinarily attempted in office practice.

For surgical applications, a large Pad applicator is used as the Indifferent Electrode, and is applied to the patient with spacing of one felt spacer or equivalent. A special adapter plug is furnished with the Standard Set of Surgical Accessories for correctly hooking up the "indifferent" Electrode. This adapter must be used to insure proper and positive control. The Pad lead connects to the adapter plug which in turn plugs in the indifferent terminal, (marked SUR. IND.). The active electrode is connected to the "Active" terminal, (marked SUR. ACT.).

While doing electro-surgery, the Main Switch should be left in the "OFF" position and the foot switch used to control the current. The Pilot Lamp lights up only when the foot switch is depressed.

The supply and foot switch leads should be kept as far away as possible from the active and indifferent surgical cords. Never allow the surgical leads to droop near the supply and foot switch leads. Experimental application on a piece of meat will enable you to determine satisfactory power settings for the various techniques you intend to use.

When experimenting with meat, however, it is important to interpose a "patient" in the circuit by having a helper sit on the indifferent pad and hold the meat, or by doing so yourself. Otherwise power settings will not be the same as when working on a patient because of the very much smaller "capacity" of the piece of meat.

When using the unit for electro-surgery, remember you are working in the presence of electrical sparks which may ignite inflammable cleansing liquids, solvents or explosive gasses. Allow time for complete evaporation of alcohol or other inflammable fluids before applying the current and do not use ethylene, cyclopropane, open ether or other dangerously explosive anaesthetics.

USE THIS SPACE FOR TREATMENT NOTES

GENERAL PRECAUTIONS

CAUTION

This machine is sold only for use by or under the direction of a qualified physician. The observance of safe and established medical practice is essential to its proper use; otherwise, there are possibilities of injuries to patients or operator.

For Protection of Patient and Operator:

1. Be sure that metal cabinet is properly grounded in accordance with grounding instructions furnished. Shock to patient or operator is otherwise possible.
2. To avoid skin burns, always use ample spacing between treatment applicators and patient's skin, keep applicator leads well away from contact with patient and maintain treatment heat below patient's tolerance at all times. (Heat insensitive patients should not be treated. Determine heat sensitivity with each patient in advance of treatment.)
3. Metal heats rapidly and intensively in the presence of radio frequency energy and to avoid burns from this source, all metal objects on patient's person must be removed from the field or vicinity of the applicators. (Look for and remove hair pins, lingerie buckles, pins, garter buckles, necklaces, charms, watches, chains, corsets with metal stays, spectacles, ear-rings, collar buttons, tie clasps, etc., and be careful about treatment of patients with history of orthopedic surgery.)
4. Warn patients against touching leads or applicators during treatment and be careful that applicator does not slip off spacing material during treatment and contact the skin.
5. Kapok filled cushions, "inner spring" mattresses and keratol (imitation leather) table tops and pads have been known to heat to the burning point from contact with short wave applicators and it is well to keep applicators or leads at least 4" away from all such articles.
6. After treatment of any duration, a "cooling off" period should be allowed before dismissing the patient from your office (especially in cold weather.)
7. When using the unit for electrosurgery, remember that you are working in the presence of electrical sparks which may ignite inflammable cleansing liquids, solvents or explosive gasses. Allow time for complete evaporation of alcohol or other inflammable fluids before applying the current and do not use ethylene, cyclopropane, open ether or other dangerously explosive anaesthetics.

For Protection of Machine and Applicators:

1. Be sure that plugs are pushed all the way in and that they are connected to the proper terminals for the applicator being used.
2. When pulling plugs out of terminals, grasp the plug, not the cord.
3. Always use an individual outlet. Do not connect machine to same outlet with other appliances.
4. Always separate applicators at least four inches from metal table, metal objects, cabinet of machine, inner spring mattresses or keratol covered pads or cushions. Do not cross applicator leads or allow them to come in contact with metal.
5. Avoid breakage of Treatment Drums by careful handling and do not tighten holding screws excessively.

SERVICE NOTES

TUBES: It is to be expected that after prolonged use, the vacuum tubes run out their normal life cycle and will need replacing. New tubes should be ordered direct from Company or through the dealer who supplied the machine. Tubes supplied by us are tested thoroughly for maximum electro-therapeutic service. This insures your getting proper tubes from which best results can be obtained.

As a rule, the tubes do not burn out -- there will simply be noted a gradual decrease on the current output of the machine. Continue to use the tubes until the output falls below a satisfactory therapeutic value. In ordering new tubes, be sure to give serial number of your machine, as several types of tubes are in use and you must have the proper tube for your particular unit.

All defective tubes are to be returned for inspection in same container as replacement tubes were received in. Tubes proving defective in service within the guarantee period will be adjusted, based on the use they have provided.

REPLACING PILOT LIGHT: Should pilot burn out, a new one may be inserted by removing back panel, making sure the supply cable first is disconnected. The pilot lamp socket can be dropped down by pulling socket from friction clamp. Remove bulb from socket, replace, and put socket firmly back into position.

APPLICATORS: As all rubber deteriorates somewhat under the influence of heat, it will be necessary to replace the rubber covered electrodes after long use. This will occur only after a long time, but should be looked out for. Long exposure to the rays of the sun or an ultra-violet lamp also deteriorates the rubber. If the rubber develops cracks, becomes "spongy" or brittle, this indicates that replacements are in order.

ALWAYS GIVE SERIAL NUMBER OF MACHINE
WHEN WRITING FOR INFORMATION OR REPLACEMENT PARTS.

THE LIEBEL-FLARSHEIM COMPANY
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